PCB Transport and Fate Modeling at New Bedford Harbor, Massachusetts: Food Web Modeling

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Background/Objectives. For the New Bedford Harbor Superfund site, US-EPA Region 1 requested that the physical, chemical, and biological modeling, performed by Battelle more than two decades ago, be updated. Updating of the modeling effort, in part, arose from the need to evaluate the effects (upon the remediation) of differing harbor development scenarios not envisioned in the original modeling effort, e.g., new port infrastructure and land uses. Additionally, the original modeling effort was limited to 10-year post-remediation scenarios and because of changes in remedial schedules/timelines, developing new forecasts based upon the actual work done to date was considered highly desirable. Besides these considerations, significant improvements in the hydrodynamic, sediment transport, and food web models have occurred since the original modeling, and the major fish species in the food web have changed from winter flounder (*Pleuronectes americanus*) to black sea bass (*Centropristis striata*) and scup (*Stenotomus chrysops*). This presentation will focus on the food web modeling portion of the modeling effort. The objectives of the presentation are to discuss and evaluate issues of calibration and validation with sparse data sets over time and to present forecasts for the different post-remediation scenarios.

Approach/Activities. For the food web modeling portion of the effort, a dynamic version of the Arnot and Gobas (2004) food web model was constructed whereby daily concentrations were inputted to the model. The entire New Bedford site was divided into six biological areas, i.e., Buzzards Bay, Outer Harbor (2 areas), and Inner Harbor (3 areas), and for each biological area, an average concentrations were computed for each day from the outputs of fate and transport model (i.e., LTFATE model with SEDZLJ dynamically linked to EFDC). The modeled species were blue mussels (*Mytilus edulis*), quahogs (*Mercenaria mercenaria*), blue crabs *(Callinectes sapidus)*, lobster (*Homarus americanus*), winter flounder (*Pleuronectes americanus*), black sea bass (*Centropristis striata*) and scup (*Stenotomus chrysops*), and for these species, age class structures were used. The food web model includes prey items for these species: phytoplankton, generic zooplankton, generic polychaete, generic amphipod, mummichog (killifish; *Fundulus heteroclitus*), and sea lettuce (*Ulva lactuca*). In the modeling effort, seasonal migration of the lobster, flounder, black sea bass, and scup were accomplished by moving the species to and from Buzzards Bay following their seasonal migration patterns.

Results/Lessons Learned. Results to be presented include data and analyses on calibration and validation with sparse data, parameter sensitivity, forecast uncertainties, and the forecasts for the post-remediation scenarios including monitored natural recovery (MNR) remedial option; the baseline for comparing all of the post-remediation scenarios.

This abstract does not necessarily reflect U.S. EPA policy.